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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/028,918	Applicant(s) SIRET ET AL.	
	Examiner Susy N Tsang-Foster	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5,7,8 and 10-15 is/are pending in the application.
- 4a) Of the above claim(s) 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7,8 and 10-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment filed on 1/12/2004. Claims 3, 6, and 9 have been cancelled. Claims 1, 2, 4, 5, 7, 8, and 10-14 have been amended. Claim 15 has been withdrawn. Claims 1, 2, 4, 5, 7, 8, and 10-15 are pending. Claims 1, 2, 4, 5, 7, 8, and 10-14 are finally rejected for reasons of record which are reiterated below for applicant's convenience.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 4, 7, 11, and 14 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Watanabe et al. (US 6,489,062 B1).

See abstract; col. 1, lines 7-13; col. 2, lines 50-56; col. 4, lines 4-10; col. 7, lines 27-67; col. 8, lines 1-42; col. 12, lines 54-61 of the reference.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5, 8, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (US 6,489,062 B1).

Watanabe et al. disclose all the limitations of claims 5, 8, 12, and 13 (see above) except the specific portions of the elastomer and/or cellulose compound in weight percent in the binder as recited in the claims.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the amount of elastomer and/or cellulose compound in the binder mixture having the claimed weight percentages for each component in the binder mixture because it is within the skill of the artisan to adjust the amount of binder components in a mixture to the appropriate viscosity for ease of shaping the electrode mixture containing the binder when manufacturing the electrode.

Furthermore, it has been held in the courts that when the general conditions of a claim are similarly disclosed in the prior art, it is not inventive to optimize general conditions as concentration. In re Aller, Lacey and Hall, 105 USPQ 233,235.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (US 6,489,062 B1) in view of Shizuka et al. (US 6,159,637).

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Watanabe et al. disclose all the limitations of claim 10 except that the binder includes a mixture of carboxymethylcellulose and an acrylonitrile/butadiene copolymer. Watanabe et al. do disclose that the binder in the negative electrode can be a mixture of a polysaccharide such as carboxymethylcellulose and polymers having rubber elasticity such as ethylene-propylene-diene (EPDM), styrene-butadiene rubber (SBR), and polybutadiene (see col. 7, line 56 to col. 8, line 5).

Shizuka et al. teach that the negative and positive electrodes of a rechargeable lithium storage cell comprises a binder that may be EPDM, SBR, or NBR (acrylonitrile/butadiene copolymer) (col. 7, lines 29-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use acrylonitrile/butadiene copolymer (NBR) in the binder mixture of Watanabe et al. as the polymer having rubber elasticity because NBR is compatible with a lithium battery environment and it is chemically equivalent to SBR and EPDM disclosed by Shizuka et al. as a binder in a lithium battery.

7. Claims 1, 2, 4, 5, 7, 8, and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herreyre et al. (US 6,399,255 B2) in view of Watanabe et al. (US 6,489,062 B1).

Herreyre et al. disclose a rechargeable lithium storage cell (col. 1, lines 5-16) including a positive electrode comprising an active material selected from the group consisting of a lithiated oxide of a transition metal, such as nickel, cobalt, manganese, vanadium, and iron (col. 4, lines

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51-56) and a negative electrode comprising an active material selected from the group consisting of graphite, coke, and carbon black and a binder (col. 2, lines 46-56; col. 4, lines 44-50). The binder can be an elastomer selected from the group consisting of a copolymer of acrylonitrile and butadiene and a copolymer of styrene and butadiene and the elastomer is 30 to 70 wt% of the binder (col. 3, lines 50-57). In an another embodiment, the binder contains a cellulose compound such as carboxymethyl cellulose and the cellulose compound is 30 to 70 wt% of the binder (col. 3, lines 58-67). In an another embodiment, the binder is a mixture of an elastomer and a cellulose compound and the elastomer contained in the mixture lies in the range of from 30 to 70 wt% of the binder and the cellulose compound lies in the range of 30 to 70 wt% of the binder (col. 4, lines 5-17). Specific examples of mixtures for a binder are a mixture of a copolymer of acrylonitrile and of butadiene with carboxymethyl cellulose and a mixture of a copolymer of styrene and of butadiene and carboxymethyl cellulose (col. 4, lines 1-12).

Herreyre et al. do not disclose that the negative electrode active material can be a mixed oxide of lithium and titanium with the general formula $\text{Li}_x\text{Ti}_y\text{O}_4$ in which $0.8 \leq x \leq 1.4$ and $1.6 \leq y \leq 2.2$.

Watanabe et al. teach that in a lithium rechargeable cell, a negative electrode containing lithium titanate having a spinel structure given by the general formula $\text{Li}_4\text{Ti}_5\text{O}_{12}$ which reduces stoichiometrically to $\text{Li}_{4/3}\text{Ti}_{5/3}\text{O}_4$ having an electrode potential of about 1.5 to 2.5 V (col. 2, lines 50-65 and col. 4, lines 23-25) used in conjunction with positive electrode materials selected from the group consisting of LiCoO_2 , LiNiO_2 , or LiMn_2O_4 gives a battery that allows reflow soldering during manufacture of the battery because these electrode materials are thermally stable and do not react with the electrolyte in contrast with the use of a carbon material having lithium in

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contact therewith or doped electrochemically with lithium that reactant with the electrolyte at reflow temperatures exceeding 200 °C and the reaction suppresses the amount of lithium that is doped in the carbon and the capacity is sacrificed (col. 3, lines 55-66 and col. 4, lines 4-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the carbon active material in the negative electrode of Herreyre et al. with lithium titanate because lithium titanate is thermally stable and does not react with the electrolyte during reflow soldering of the battery components and capacity of the battery does not deteriorate during reflow soldering of the battery.

Response to Arguments

8. Applicant's arguments filed 1/12/2004 have been fully considered but they are not persuasive.

With respect to art rejections based on Watanabe et al., applicant asserts the following: that the organic binder in Watanabe et al. is not particularly limited and that Watanabe et al. cites a plurality of active materials on the one hand and on the other hand a plurality of binders and that some of the binders of Watanabe are fluorinated and that according to examples 7 to 12 at col. 12, lines 54-61, the cell may comprise LiCoO_2 as cathodic active material, $\text{Li}_4\text{Ti}_5\text{O}_{12}$ as anodic active material, the anodic binder being polyacrylic acid as disclosed at col. 9, lines 42-45; that Watanabe prefers as binder at least one of polysaccharides, thermoplastic resins, thermosetting resins, polymers having rubber elasticity etc..., or their mixture and that among these compounds, Watanabe cites at the same level carboxymethyl cellulose, hydroxypropyl

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cellulose, styrene-butadiene rubber, and tetrafluoroethylene, polyvinylidene fluoride, fluorocarbon resin, and fluororubber. Applicant submits that Watanabe fails to disclose each and every element of the present invention because there is no disclosure, teaching, or suggestion of selecting and combining one of the active materials with a non-fluorinated binder including a mixture of two compounds selected in the list of the numerous binder given by Watanabe.

In response, Watanabe et al. specifically discloses a lithium transition metal oxide such as LiCoO_2 as the positive electrode material and $\text{Li}_4\text{Ti}_5\text{O}_{12}$ as the negative electrode active material in examples 7 to 12 at column 12 lines 54-61 so that there is no selecting and choosing the positive electrode active material and the negative active material to meet claim 1 which recites that the positive electrode includes one or more oxides of a transition metal and a negative electrode active material which is a mixed oxide of lithium and titanium having the claimed formula which is stoichiometrically disclosed by the formula $\text{Li}_4\text{Ti}_5\text{O}_{12}$ in Watanabe.

The reference as a whole discloses that the organic binder in the electrode is not particularly limited as recited in column 7, lines 40-58. Watanabe et al. disclose that the organic binder is generally and preferably at least one of polysaccharides, thermoplastic resins, thermosetting resins, polymers having rubber elasticity, etc, or their mixtures at column 7, lines 56-61. Watanabe et al. disclose that the organic binder is one of at least 4 categories of polymers (polysaccharides, thermoplastic resins, thermosetting resins, polymers having rubber elasticity) or their mixtures and give specific examples that fall under each of the four categories. The four categories of polymers do not make up an extensive list. Thus the reference at column 7, lines 56-61 meets the limitation "said binder includes a mixture of an elastomer and a cellulose

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compound” recited claim 1 because mixtures of these four categories of polymers are specifically disclosed. Furthermore, the claimed limitation is open ended and can comprise more than 2 components.

Applicant asserts that Watanabe does not indicate how to choose a binder capable of forming a stable emulsion in suspension in water.

In response, claim 2 recites that the “non-fluorinated polymeric binder is soluble in water or capable of forming a stable emulsion in suspension in water” and is an inherent property of a non-fluorinated polymeric binder comprising cellulose and an elastomer.

With respect to the art rejections based on Herreyre et al. in view of Watanabe et al., applicant asserts that it would not have been obvious to one of ordinary skill in the art to combine the teachings of Herreyre et al. with Watanabe et al. because for one of ordinary skill in the art, it is not obvious to change an active material without studying the association with a specific binder because the binder and the active material may react with each other during the electrochemical functioning, or a binder which is adapted to one active material, may have mechanical properties (such as adhesion) which renders it inadaptatable to another active material.

In response, the Examiner has established a prima facie case of obviousness, because three basic criteria have been met. (see MPEP 706.02(j)). First, the Examiner has provided the motivation that can be found in the Watanabe et al. reference for combining the Herreyre et al. reference with the teaching of the Watanabe et al. reference as stated above in the art rejection

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section of the present office action. Second, there is reasonable expectation of success since Watanabe et al. clearly provide evidence that the lithium titanate material is chemically compatible with the elastomer and cellulose binder in the negative electrode of Herreyre et al. since Watanabe et al. disclose that suitable organic binders for an electrode containing lithium titanate as an active material in a lithium battery include polysaccharides (cellulose is an example), and polymers having rubber elasticity (elastomer) at column 7, lines 57-67 and thus the substitution of lithium titanate for carbon active material in the negative electrode comprising a binder including an elastomer and cellulose in the lithium battery of Herreyre et al. would have reasonable expectation of success. Finally, the combined prior art references meet all the claimed limitations.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


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10. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ 

Susy Tsang-Foster
Primary Examiner
Art Unit 1745